

REMARKS

Claims 1-4 and 7-12 are pending in the present application. Non-elected claims 5, 6, 13 and 14 have been canceled. Claims 1-4 and 7-12 stand rejected. Claim 1 has been amended. In view of the amendments to the claims and the following remarks, Applicants respectfully request that the rejections be withdrawn and that the claims be allowed.

Claims 1-4 and 7-12 stand rejected under 35 U.S.C. § 102(a) as being anticipated by “Continuous Wave Terahertz Quantum Cascade Laser” to Barbieri et al. (“Barbieri”). The rejection is traversed.

Barbieri was made public on September 9-10, 2002 and was authored by Stefano Barbieri, among others. Stefano Barbieri is one of the inventors of the present application, which claims priority to PCT Application No. PCT/GB02/04604 filed on October 10, 2002. Therefore, Barbieri cannot be prior art to the present application because it is not “by others” and it was not published more than one year prior to the priority date of the present application. Accordingly, Applicants respectfully request that the rejection be withdrawn and that the claims be allowed.

Claims 1-4 and 7-12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over “Terahertz Quantum Cascade Lasers” to Kohler et al. (“Kohler”) in view of U.S. Patent No. 6,560,259 to Hwang (“Hwang”). The rejection is traversed.

Claim 1 recites a laser comprising a substrate that includes a bulk region and a conducting layer. The laser also includes an active region that comprises “a quantum cascade structure provided on a first surface of the substrate such that said active region is electrically connected to said conducting layer.” The active region forms “a strip on said first surface of the substrate,” and said strip has “a cleaved facet at each end.” The active region is electrically connected to said conducting layer via first and second contacts, “said first and second contacts being disposed on opposite sides of said active region.” The laser also includes “an active region contact provided to said active region such that a potential may be applied between said active region contact and said first and second contacts to cause said active region to lase.” The potential

“is applied in parallel to said conducting layer by first and second contacts.” The active region contact is “a metal contact provided overlying said active region on a surface parallel to said first surface of the substrate.” “[E]mission from said laser is collected from one of said cleaved facets of said active region.”

Claim 1 is illustrated in figure 3 of the present application, which illustrates a laser according to claim 1. In figure 3, a top contact 31 or active region contact is formed on the upper surface of the active region 11. Application, ¶ [0073]. The top contact 31 is parallel to the “first surface of the substrate.” Application, fig. 3. The active region 11 is “a strip or ridge 15 on the surface of said conducting layer 14.” Application, ¶ [0063]. The strip includes cleaved facets such as Fabry-Perot cavities. Application, ¶ [0078]. Contacts 16 and 17 are disposed on opposite sides of the active region 11 and are used to apply a potential to the active region 11 in order to cause the active region 11 to lase. The use of a parallel-applied lasing potential results in a reduction of series resistance and, thus, operating temperature, thereby allowing the laser to achieve continuous wave operation. As explained below, neither Kohler nor Hwang teaches the disposition of two contacts on opposite sides of an active layer.

Kohler fails to teach the use of two contacts on opposite sides of the active region. In Kohler, as illustrated in Fig. 2(b), a top contact is disposed on top of the active region, and a single side contact is disposed on one side of the active region. However, a second side contact is never disclosed in Kohler, thus rendering impossible the teaching of two contacts on opposite sides of the active region.

Hwang also does not teach the use of two contacts disposed on opposite sides of the active layer. In Fig. 5 of Hwang, active region 105 is not disposed in between contacts. Metal stripes 122 may be used as contacts, but metal stripes 122 are not disposed on opposite sides of the active layer. Additionally, Hwang states that the contacts 122 are placed so that they do not block the outgoing laser light. Col. 18, ll. 21-40. Alternatively, a single transparent contact could be used. *Id.* However, there is no mention in Hwang of possible parallel connections between the active region and the two contacts. Even where two contacts are shown, the contacts are both above

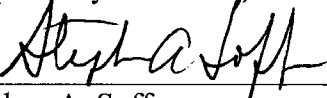
the active region and are thus not disposed on opposite sides of the active region. Thus, the configuration shown in Hwang would not allow connections to be made in parallel at opposite sides of the active region.

Accordingly, Hwang fails to anticipate claim 1. Claim 1 is thus allowable over Hwang. Claims 2-4 and 7-12 depend from claim 1 and are allowable for at least the same reasons that claim 1 is allowable. Applicants respectfully request that the rejections be withdrawn and that the claims be allowed.

In view of the above, Applicants believe the pending application is in condition for allowance. If there are any additional charges in connection with this filing or any subsequent filings (including but not limited to issue fees), the Examiner is respectfully requested and authorized to charge Deposit Account No. 04-1073 therefor under Order No. M0025.0325/P325.

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